

## CLAIMS

- 17 -

1. Reactor and/or mixing vessel comprising at least
  - an outer in a direction extending vessel-like member and
  - an inner in the direction extending member arranged within the outer member, at least one of which is adapted for rotation with respect to the other member, the direction being the rotation axis, and at least one of which has a cross-section at least nearly perpendicular to the rotation axis of non-circular shape in such a way that the gap between the inner and the outer members is of non-constant width therebetween in circumferential direction, and
  - at least one inlet for introduction of fluid and at least one outlet for discharging fluid in and out of the reactor and/or mixing vessel.
2. Reactor and/or mixing vessel according to claim 1, characterized in that the outer member is a cylinder having a cross-section of circular shape and the inner member does have a cross-section of non-circular shape.
3. Reactor and/or mixing vessel according to one of the claims 1 or 2, characterized in that the inner member is adapted for rotation with respect to the outer member.
4. Reactor and/or mixing vessel according to one of the claims 1 to 3, characterized in that at least one member does have a cross-section of non-circular shape such as an elliptic-, a triangle-, a square- or a polygon-like shape, preferably with rounded off edges.
5. Reactor and/or mixing vessel according to one of the claims 1 to 4, characterized in that at least one of the two members does have a wave-like shape and/or comprises longitudinally extending grooves and/or comprises perforations.
6. Reactor and/or mixing vessel according to one of the claims 1 to 5, characterized in that both members are adapted for rotation, preferably in opposite direction.
7. Reactor and/or mixing vessel according to one of the claims 1 to 6, characterized in that

the two members are arranged concentrically. <sup>- 18 -</sup>

8. Reactor and/or mixing vessel according to one of the claims 1 to 6, characterized in that the two members are arranged eccentrically.
9. Reactor and/or mixing vessel according to one of the claims 1 to 8, characterized in that at least one member wall is at least partially permeable for fluids insofar that exchange of component(s) between inside and outside the reactor and/or mixing vessel is possible.
10. Reactor and/or mixing vessel according to one of the claims 1 to 9, characterized in that at least one permeable member wall can be used for filtration of component(s) from the reaction mixture in the reactor and/or mixing vessel.
11. Reactor and/or mixing vessel according to one of the claims 1 to 10, characterized in that the ratio of width of the largest gap to the smallest gap is more than 1.1, preferably is within the range of 1.2 to 3.
12. Reactor and/or mixing vessel according to one of the claims 1 to 11, characterized in that the ratio between the average diameter of the outer member such as e.g. a cylinder to the smallest gap width between the two members is smaller than 50, preferably within the range of 5 to 20.
13. Process for reacting and/or mixing of at least one fluid component within a reactor according to one of the claims 1 to 12, characterized in that the fluid is mixed or reacted within a gap between an outer and an inner member, at least one of which is of a cross-section of non-circular shape so that the gap width at a fixed position varies with the rotation of at least one of the two members.
14. Reaction according to claim 13, characterized in that by rotating at least one of the members a substantially narrow distribution of energy dissipation rate is generated for creating a substantially homogenous flow environment.
15. Process according to one of the claims 13 or 14, characterized in that components are

- 19 -

used to carry out biochemical or bioreactions within a reactor according to one of the claims 1 to 12.

16. Process according to one of the claims 13 to 15, characterized in that a single or multiple phase reaction or a mixing process is executed which comprises mixing of components in a reactor according to one of the claims 1 to 12.
17. Polymerization or copolymerization process of monomers and/or oligomers within a reactor according to one of the claims 1 to 12.
18. Biochemical or bioreaction of at least one biochemical component within a reactor according to one of the claims 1 to 12.
19. A granulation and/or coagulation process of particles comprising granulating said particles dispersed in a fluid in the granulator or coagulator, respectively, equivalent to a reactor according to one of the claims 1 to 12.